

Catherine Naud

Contact details:

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Education:

1996: PhD in Physics

Laboratoire de Météorologie Dynamique, University Paris VI, Paris, France.

Title: "Multifractal Analysis and simulations of the interaction between clouds and radiation". Supervisor: Daniel Schertzer. Recipient of a MRE grant.

1993: D.E.A in Quantum Physics (Master of Science)

University Paris VI, Paris, France

Research project: "Cavitation in superfluid helium-4" in the Laboratoire de Physique Statistique de l'école Normale Supérieure, with Sébastien Balibar as a supervisor.

1992: Maîtrise in Physics (Bachelor degree)

University of Poitiers, France.

Research Interests:

Cloud properties in the midlatitudes

Understand all the factors that influence cloud amounts and properties in the midlatitude in order to constrain general circulation models and improve cloud parameterizations. Use a wide range of satellite and ground based observations (e.g. NASA MODIS, CloudSat-CALIPSO, MISR, DOE ARM sites, SIRTA near Paris).

Extratropical cyclones

Use of compositing techniques to study factors that impact on cloud, precipitation and radiation fluxes in extratropical cyclones

Cloud remote sensing: applications and validation studies

Understand the strengths and weaknesses of different techniques and instruments that retrieve cloud properties. Some examples of instruments and cloud retrievals: ISCCP cloud cover and top pressure over the Tibetan Plateau, MODIS cloud top pressure, SEVIRI cloud top pressure, MISR cloud-top heights, ATSR-2 stereo cloud top heights, MOS cloud top heights, MERIS cloud top pressure, radiosonde derived cloud boundaries. For "truth", I used active ground-based instruments from the DOE ARM program, Chilbolton (UK) or SIRTA (France) and recently satellite borne NASA CloudSat-CALIPSO.

Professional experience:

July 2006-present: Associate research scientist

Department of Applied Physics and Applied Mathematics, Columbia University, and Goddard Institute for Space Studies, New York, NY.

October 2004- June 2006: Postdoctoral scientist

Department of Applied Physics and Applied Mathematics, Columbia University, and Goddard Institute for Space Studies, New York, NY.

February 2001- September 2004: Research fellow

Department of Geomatic Engineering, University College London, London, UK.

July 1997-January 2001: Research associate

Space and Atmospheric Physics group, Physics department, Imperial College of Science, Technology and Medicine, London, UK.

Teaching experience:

1997 – 2000: Tutoring of 3rd year undergraduate students for their comprehensive paper in physics.

1993 – 1996:

- Demonstrating practicals in electronics for first year “Génie Télécommunication-réseaux” undergraduate students (IUT Villetteuse, University Paris XIII, France).
 - Tutorials in Mathematics and Physics for first and second year undergraduate students in physics and life sciences (University Paris VI, France).
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Current Investigations in funded projects:

Principal investigator: NASA The science of TERRA and AQUA: “Midlatitude ocean underestimate in GCM cloud cover: assessment based on Terra and Aqua measurements”, Columbia University, 2011-2013.

Co-Investigator: NASA CloudSat science team recompete: “An Examination of the Relationship Between Aerosols, Cloud Vertical Structure, and Cloud Radiative Forcing in Mid-latitude Cyclones.”, PI: Derek Posselt, University of Michigan- Ann Arbor. 2010-2012.

Co-Investigator: NASA CloudSat Science team recompete, “CloudSat-CALIPSO studies of tropical anvils and polar high clouds”, PI: Anthony Del Genio, NASA-GISS, New York, 2010-2012.

Professional society membership:

American Geophysical Union (2008-)

American Meteorological Society (2010-)

Sigma Xi (2010-)

Invited presentations:

Naud C. M., “Cloud vertical distribution in extratropical cyclones”, CCNY-GISS convection seminars, 12/07/2010.

Naud C. M., “Cloud vertical distribution across midlatitude fronts from CloudSat-CALIPSO and the GISS GCM”, CloudSat-CALIPSO science team meeting, Madison, WI, 07/29/2009.

Naud C. M., “Midlatitude cyclones: cloud distribution in warm fronts”, NASA-GISS lunch seminar series, 02/18/2009.

Naud C. M., “Midlatitude frontal clouds in CloudSat and the GISS GCM”, CloudSat-CALIPSO science team meeting, Seattle, WA, 08/21/2008.

Naud C. M., “Impact of atmospheric state and dynamics on cloud properties”, Institute for terrestrial and planetary atmospheres, Stony Brook University, NY, 04/25/2007.

Naud C. M., “Cloud thermodynamic phase profiles in midlatitudes”, DOE Atmospheric Radiation measurement program science team meeting, Monterey, CA, 03/28/2007.

Naud C. M., “The impact of dynamics and atmospheric state on cloud properties”, NASA-GISS, NY, 09/22/2006.

Publications:

Peer-reviewed

2010

Naud C. M., A. D. Del Genio, M. Bauer and W. Kovari, 2010: Cloud vertical distribution across warm and cold fronts in CloudSat-CALIPSO data and a general circulation model. *J. Climate*, 23, 3397-3415, doi:10.1175/2010JCLI3282.1.

Naud C. M., A. Del Genio, M. Haeffelin, Y. Morille, V. Noel, J.-C. Dupont, D. D. Turner, Z. Wang, C. Lo and J. Comstock, 2010: Thermodynamic phase profiles of optically thin midlatitude clouds and their relation to temperature. *J. Geophys. Res.*, 115, D11202, doi:10.1029/2009JD012889.

Naud, C. M., and Y.-H. Chen, 2010: Assessment of ISCCP cloudiness over the Tibetan Plateau using CloudSat-CALIPSO. *J. Geophys. Res.*, 115, D10203, doi:10.1029/2009JD013053.

2009

Kokhanovsky, A.A., C.M. Naud, and A. Devasthale, 2009: Intercomparison of ground-based radar and satellite cloud-top height retrievals for overcast single-layered cloud fields. *IEEE Trans. Geosci. Remote Sens.*, 47, 1901-1908, doi:10.1109/TGRS.2008.2010455.

2008

Naud C. M., A. Del Genio, G. G. Mace, S. Benson, E. E. Clothiaux and P. Kollias, 2008: Impact of dynamics and atmospheric state on cloud vertical overlap, *J. Climate*, 21, 1758-1770.

2007

Naud C., K. L. Mitchell, J.-P. Muller, E. E. Clothiaux, P. Albert, R. Preusker, J. Fischer and R. J. Hogan, 2007: Comparison between ATSR2 stereo, MOS O₂-A band and ground-based cloud top heights, *Int. J. Remote Sens.*, *Int. J. Remote Sens.*, 28, 1969-1987.

Muller J.-P., M.-A. Denis, R. D. Dundas, K. L. Mitchell, C. Naud and H. Mannstein, 2007: Stereo cloud-top heights and cloud amount retrieval from ATSR2. *Int. J. Remote Sens.*, 28, 1921-1938, doi:10.1080/01431160601030975.

Naud C., M., B. A. Baum, M. Pavolonis, A. Heidinger, R. Frey, H. Zhang, 2007: Comparison of MISR and MODIS cloud-top heights in the presence of cloud overlap, MISR special Issue of *Remote Sensing of Environment*, 107, 200-210.

2006

Naud C. M., J.-P. Muller and E. E. Clothiaux, 2006: Assessment of multi-spectral ATSR2 stereo cloud-top height retrievals, *Remote Sensing of Environment*, 104, 337-345.

Naud C. M., A. Del Genio and M. Bauer, 2006: Observational constraints on cloud thermodynamic phase in midlatitude storms, *Journal of Climate*, 19 (20), 5273-5288.

2005

Naud C. M., J.-P. Muller and P. de Valk, 2005: On the use of ICESAT-GLAS measurements for MODIS and SEVIRI cloud-top height accuracy assessment, *Geophys. Res. Letters*, 32, L19815, doi:10.1029/2005GL023275

Naud C., J.P. Muller, B. Baum, P. Menzel and E. E. Clothiaux, 2005: Inter-comparison of MODIS, MISR and radar cloud-top heights, *Annales Geophysicae*, 23, 2415-2424.

Naud C., J.-P. Muller, E. C. Slack, C. L. Wrench and E. E. Clothiaux, 2005: Assessment of the performance of the Chilbolton 3-GHz Advanced Meteorological radar for cloud-top height retrieval, *J. Appl. Meteorol.*, 44 (6), 876-887.

Haeflalin, M. , Barthès, L., Bock, O., Boitel, C., Bony, S., Bouniol, D., Chepfer, H., Chiriaco, M., Cuesta, J., Delanoë, J., Drobinski, P., Dufresne, J. -L., Flamant, C., Grall, M., Hodzic, A., Hourdin, F., Lapouge, F., Lemaître, Y., Mathieu, A., Morille, Y., Naud, C., Noël, V., O'Hirok, W., Pelon, J., Pietras, C., Protat, A., Romand, B., Scialom, G. and Vautard, R. 2005: SIRTA, a ground-based atmospheric observatory for cloud and aerosol research, *Annales Geophysicae*, Vol. 23, pp 253-275.

2004

Naud C., J.-P. Muller, M. Haeflalin, Y. Morille and A. Delaval, 2004: Assessment of MISR and MODIS cloud top heights through inter-comparison with a back-scattering lidar at SIRTA, *Geophys. Res. Lett.*, 31, L04114.

2003

Naud C., J.-P. Muller and E. E. Clothiaux, 2003: Comparison between active sensor and radiosonde cloud boundaries over the ARM Southern Great Plains site, *J. Geophys. Res.*, 108, D04, pp AAC 3 1-12.

2002

Naud C., J.-P. Muller and E. E. Clothiaux, 2002: Comparison of cloud top heights derived from MISR stereo and MODIS CO₂-slicing, *Geophys. Res. Lett.*, 29, No. 16, pp 42.1-4.

1994

Petersen M. S., C. Naud, S. Balibar and H. J. Maris, 1994: Experimental Observations of cavitation in superfluid helium-4, *Physica B*, 194-196, pp 575-576.

Book chapter

1996

Naud C., D. Schertzer and S. Lovejoy, 1996: Radiative Transfer in multifractal atmospheres: fractional integration, multifractal phase transitions and inversion problems, in *Stochastic Problems in geosystems*, I.M.A series Vol. 85, eds., W. Woycinsky and S. Molchanov, Springer Verlag, N.Y. , pp 239-267.

Conference proceedings

- Naud C. M. and A. Del Genio, 2006, Observational constraints on cloud thermodynamic phase in midlatitude storms, in *Proceedings of the American Meteorological society 12th conference on cloud physics*, Madison, WI, 10-14 July, 2006.
- Naud C. and A. Del Genio, 2006, Cloud overlap dependence on Atmospheric dynamics, in *Proceedings of the 16th Atmospheric Radiation Measurement science team meeting*, Albuquerque NM, 27-31 March 2006.
- Naud C., M. Haeffelin, J.-P. Muller, Y. Morille and A. Delaval, 2004, Comparaison entre hauteurs du sommet des nuages mesurées avec MISR, MODIS et lidar, *proceedings of AEI2004*, Paris, 23-24 March 2004.
- Naud C., B. Baum, R. Bennartz, J. Fischer, R. Frey, P. Menzel, J.-P. Muller, R. Preusker and H. Zhang, 2003, Inter-comparison of MERIS, MODIS and MISR cloud top heights, *Proceedings of ESA MERIS workshop*, 10-14 Nov. 2003, ESA, Frascati, Italy.
- Bizzarri B., M. Desbois, C. Stanfuss, J. Harries, J. Murray, J. E. Russell, C. Naud, A. Gasiewski, K. Kunzi, G. Heigster, J. Miao, A. Mugnai, G. Gobbi, G. Loiberti, S. Dietrich, A. Slingo, A. Sutera, I. Bordi, S. Tibaldi, P. Alberoni and R. Rizzi, 2000, Scientific background for CLOUDS - a cloud and radiation monitoring satellite, *Proc. of SPIE symposium on Remote Sensing of clouds and the atmosphere*, Barcelona 25-29 Sept..
- Naud C. J. E. Russell and J. E. Harries, 2000, Remote Sensing of cirrus cloud properties in the far infrared, *Proc. of SPIE symposium on Remote Sensing of clouds and the atmosphere*, Barcelona 25-29 Sept..
- Harries J. E., C. Naud and H. Brindley, 2000, The Geostationary Earth Radiation Budget (GERB) experiment: Science applications, *proc. IRS 2000*, St Petersburg, 24-29 July.
- Naud C. J. E. Russell, and J. E. Harries, 2000, Radiative effect of cirrus clouds in the far infrared, *Proc. IRS 2000*, St Petersburg, 24-29 July.
- Naud C., J. E. Russell and J. E. Harries, 1998, High spectral resolution simulation of the impact on heating rates of cirrus clouds in the far infrared, 3495, *Proc. SPIE*, Barcelona, Sept. 1998.
- Russell J. E., R. J. Bantges, C. M. Naud and J. D. Haigh, 1998, High spectral resolution simulations of cirrus from 4 to 100 microns, *Proceedings of Cirrus conference*, Baltimore, MD, USA.
- Russell J. E., R. J. Bantges, C. M. Naud and J. D. Haigh, 1998, The effect of cirrus cloud in the infrared (4-100 microns)- high spectral resolution simulations, 3495, *Proc. SPIE*, Barcelona Sept. 1998.
- Schertzer D., S. Lovejoy, F. Schmitt, C. Naud, D. Marsan, Y. Chigirinskaya and C. Marguerit, New developments and old questions in multifractal cloud modelling, satellite retrievals and anomalous absorption, *proceedings of the 7th Atmospheric radiation measurements Science team meeting*, US Dpt of Energy, Washington DC, 1997.
- Naud C., D. Schertzer and S. Lovejoy, Fractional integration and radiative transfer in a multifractal atmosphere, *proceedings of the 5th Atmospheric radiation measurements Science team meeting*, US Dpt of Energy, Washington DC, 1995.

Reports

- Belli G., M. Cambiaghi, Y. Chigirinskaya, D. Kwak, A. Lanza, D. Marsan, C. Naud, E. Quinto, S. P. Ratti, A. Ravera, G. Salvadori, D. Scannichio, D. Schertzer, F. Schmitt, Multifractal approach to post-Chernobyl ^{137}Cs cumulative soil deposition in some European Countries, EEC contract FI3P-CT93-0077, Final report 1996.
- Naud C., J. E. Russell, R. J. Bantges and J. E. Harries, Effect if cirrus clouds on the far infrared outgoing radiation: influence of ice crystal shapes, in REFIR Science Report Studies, DFUB99-1, 1999.

Conferences and meetings:

2010:

NASA A-train symposium, New Orleans, Louisiana, Oct 25-28, "Cloud vertical distribution in extratropical cyclones", oral.

DoE Atmospheric system research (ASR) science team meeting, Bethesda, Maryland, March 15-19, "Cloud vertical distribution in extratropical cyclones", poster.

2009:

CloudSat-CALIPSO science workshop, Madison, Wisconsin, July 28-31, "Cloud vertical distribution across warm fronts from CloudSat-CALIPSO and the GISS GCM", oral.

DoE Atmospheric Radiation Measurement (ARM) science team meeting, Louisville, Kentucky, March 30-April 2, "Cloud thermodynamic phase distribution in midlatitude optically thin clouds", poster.

2008:

Fall American Geophysical Union (AGU) conference, San Francisco, California, December 15-19, "Midlatitude frontal clouds in CloudSat observations and the GISS GCM", poster

CloudSat-CALIPSO science team meeting, Seattle, Washington, August 19-21, "Midlatitude frontal clouds in CloudSat and the GISS GCM", oral.

SIRTA annual meeting, Palaiseau, France, March 27, "Profiles de phase thermodynamique dans des nuages de faible épaisseur optique pour deux sites de latitude moyenne", oral.

DoE Atmospheric Radiation Measurement (ARM) science team meeting, Norfolk, Virginia, March 10-14, "Cloud thermodynamic phase distribution in midlatitude optically thin clouds", poster.

2007:

DoE Atmospheric Radiation Measurement (ARM) science team meeting, Monterey, California, March 26-29, "Cloud phase profiles in mid-latitudes", oral.

2006:

American Meteorological Society 12th conference on Cloud Physics, Madison, Wisconsin, July 10-14, "Observational constraints on cloud thermodynamic phase in midlatitude storms", poster.

DoE Atmospheric Radiation Measurement (ARM) science team meeting, Albuquerque, New Mexico, March 27-30, "Cloud overlap dependence on atmospheric dynamics", poster.

NASA-MODIS science team meeting, Baltimore, Maryland, January 4-6, "Observational constraints on cloud thermodynamic phase in midlatitude storms" poster and "Combining MODIS and MISR cloud-top heights for cloud overlap detection", poster.

2005:

NASA-MISR science team meeting, Pasadena, California, December 12-14, "Fusion of MISR and MODIS cloud-top heights: application to overlap detection", oral.

NASA-MODIS science team meeting, BWI airport, Maryland, March 22-24, "MODIS and SEVIRI Cloud top height assessment with GLAS", poster and "Observational constraints on cloud thermodynamic phase in midlatitude storms", poster.

2004:

NASA-MISR science team meeting, Pasadena, California, December 7-10, "MISR cloud-height assessment using MODIS, IceSat and ground-based radar", oral.

AQUA science working group meeting, GSFC, Maryland, October 26-27, no contribution.

NASA-MODIS science team meeting, BWI airport, Maryland, July 13-15, "MOD06 (cloud-top height) validation", poster.

2003:

ESA MERIS workshop, ESA, Frascati, Italy, November 10-14, "Inter-comparison of MERIS, MODIS and MISR cloud top heights", oral.

2002:

NASA-MODIS science team meeting, Greenbelt, Maryland, July 22-24, "Validation of MODIS products through an intercomparison with MISR, GOES and ground-based radar/lidar", oral.

Round table on the aerosol-cloud-radiation interaction in boundary layer clouds, Toulouse, France, June, poster.

2001:

Terra Cloud mask meeting, Madison, Wisconsin, May 8-9, no contribution.

2000:

SPIE symposium on Remote Sensing of clouds and the atmosphere, Barcelona, Spain, September 25-29, "Remote Sensing of cirrus cloud properties in the far infrared", oral.

International Radiation Symposium (IRS2000), St Petersburg, Russia, July 24-29, "Radiative effect of cirrus clouds in the far infrared", poster.

1998:

SPIE symposium on Remote Sensing of clouds and the atmosphere, Barcelona, Spain, September 21-23, "High spectral resolution simulation of the impact on heating rates of cirrus clouds in the far infrared", oral.

1996:

European Geophysical Society general assembly, Den Haag, The Netherlands, April, oral.

1995:

DoE Atmospheric Radiation Measurement (ARM) science team meeting, San Diego, California, "Fractional integration and radiative transfer in a multifractal atmosphere", poster.

European Geophysical Society general assembly, Hamburg, Germany, April, oral.

1994:

IMA workshop on Stochastic Models in Geosystems, Minneapolis, Minnesota, May 16-20, "Radiative transfer in multifractal atmospheres", oral.

European Geophysical Society general assembly, Grenoble, France, April, oral.